

Indonesia's Agrarian Governance Through Ius Integrum Nusantara 2045 Paradigm Based On The Quadruple Helix Model

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Abstract

Agrarian governance reform in Indonesia continues to face structural conflicts stemming from land ownership inequality, regulatory fragmentation, weak legal certainty, and the marginalization of indigenous peoples' rights. In practice, the implementation of the Basic Agrarian Law (UUPA) and its derivative regulations faces significant challenges. Cases of overlapping land rights are the most prominent disputes in the land sector, hampering infrastructure development and economic equality across Indonesia. The shift in societal mindset from communal to individualistic, unclear land ownership status, and inequity in land distribution remain major issues to date. This article aims to analyze the concept of digital transformation in land administration through the Quadruple Helix model, which is operationalized to create inclusive national agrarian governance, particularly to address existing land conflicts. The research method used in this article is a juridical-normative one, integrating legal and conceptual approaches to examine agrarian governance reform. Primary legal materials, including laws and court decisions, are supplemented by secondary sources, including academic articles and institutional reports, obtained through desk research and methodical document analysis. This study applies qualitative analysis and normative legal reasoning to interpret legal norms and policy developments. An analytical framework encompassing problem mapping, diagnostic evaluation, and normative reconstruction is employed. To ensure validity and rigor, triangulation of sources and methodologies is employed, aiming to formulate an integrative and adaptive agrarian governance model. The analysis demonstrates that digital transformation in land administration has strategic potential to reduce structural agrarian conflict through land data integration and increased transparency, accountability, and public engagement. The success of digitalization in minimizing agrarian conflict requires the integration of technological innovation, institutional reform, and inclusive community engagement. The Quadruple Helix model, encompassing government, academia, industry, and the community, proves to be a useful framework for aligning the interests of various actors and combining formal and local knowledge in agrarian governance. The Ius Integrum Nusantara 2045 paradigm offers a futuristic normative framework that positions agrarian law not merely as a regulatory instrument but as a means of justice, public morality, and the protection of socio-ecological values. The integration of this paradigm with the Quadruple Helix Model enables agrarian law reform that is adaptive to digital technology while also responsive to legal pluralism and local wisdom.

Keywords: Digital Agrarian Governance; Ius Integrum Nusantara 2045; Quadruple Helix; Structural Agrarian Conflict.

1. INTRODUCTION

The Indonesian territory, which is dominated by the insular character,¹ with an area of more than 5 million km². Indonesia, as an agrarian country, has a long history in the management of its land and natural resources.² Indonesia's land system and agrarian law have gone through various complex transformational phases, the concept of Indonesia's national agrarian law, which originates from Indonesian customary law as outlined in Article 33 paragraph 3 and Article 18 B of the Constitution of the Republic of Indonesia (UD 1945), states that the state controls natural resources for the prosperity of the Indonesian people (Article 33 paragraph 3 of the 1945 Constitution), and recognizes and respects the rights of indigenous peoples (Article 18B of the 1945 Constitution), both of which are very important because they are the philosophical and constitutional basis for the formation of national agrarian law in the Basic Agrarian Law Number 5 of 1960 (UUPA), reflecting a clear orientation toward agrarian justice³.

UUPA concerning the Basic Regulations on Agrarian Principles is a major milestone in the reform of national agrarian law, is an important legal foundation that regulates the utilization and management of agrarian resources in Indonesia.⁴ Agrarian law that tries to unite the various legal systems that live in ulayat law societies, Islamic law, and Western legal systems in one universal national framework⁵. In Indonesian society, ulayat law and Islamic law do not conflict; rather, the two legal systems can coexist, and their respective roles have been established⁶.

In practice, the implementation of the UUPA and its derivative regulations faces significant challenges: A case of overlapping land right is a most prominent dispute in the land sector,⁷ resulting in hampered infrastructure development and economic equity throughout Indonesia,⁸ a change in the mindset of the community from communal to individualistic,⁹ unclear land ownership status, and injustice in land distribution are still major problems to date.¹⁰ One of the problems that often arises is the dualism between state law and customary law. State law often ignores the rights of indigenous peoples, while ulayat law does not have strong enough

¹ Yety Rochwulaningsih, Singgih Tri Sulistiyono, Noor Naelil Masruroh, Nazala Noor Maulany. Marine Policy Basis Of Indonesia As A Maritime State: The Importance Of Integrated Economy. Marine Policy 108 (2019).<https://doi.org/10.1016/j.marpol.2019.103639>

² Mira Ardilla Lubis, Muhammad Fajar Abdilla, Siti Sardiana Berutu. Agrarian Reform and Its Impact on the Indonesian Economy in the Old Order and New Order Eras. Historical Analysis. 14 no. 2 (2024): 47-52. <https://dx.doi.org/10.25077/jas.v14i2.125>

³ Firman Muntaqo, Mashudi Mashudi, Alip Dian Pratama, Abdullah Rosikh Fil Ilmi, Iza Rumesten. The Transformation of Land Law in Indonesia: From Commodification to Maqāsid and Social Justice. Al-Ahkam 35 No. 2 (2025): 287-312

⁴ Abdul Muthalib, Fence, Arifuddin Muda Harahap. The Implementation of the Basic Agrarian Law in Fulfilling the Principle of Justice from the Islamic Legal Perspective. Pena Justisia: Vol. 23, No. 3, December, 2024.

⁵ Onny Medaline, Nurhilmiyah, Rizka Syafriana, "Langkat Regional Government Land Asset Certification Implementation." *Scientific Journal of Law Enforcement*, 11 no. 1 (2024) DOI: <http://dx.doi.org/10.31289/jiph.v11i1.11830>

⁶ Fatahullah, Adi Sulistiyono, Burhanudin Harahap. "Reform of Islamic Inheritance Law: The Influence of Ulayat Law on the Institution of Mandatory Bequest in Islamic Law." *IUS Journal of Law and Justice Studies* 13 Issue 1, April 2025, E-ISSN 2477-815X, P-ISSN 2303-3827

⁷ Hendra Karianga, Ahsan Yunus. "Overlapping For Land Ownership Rights: Alternative Dispute Resolution By Ombudsman." *Russian Law Journal* 10 no. 1 (2022). DOI: <https://doi.org/10.52783/rj.v10i1.260>

⁸ Geospatial Information Agency, *Implementation of the One Map Policy to Overcome the Problem of Land Overlap* (2021) <https://www.big.go.id/content/berita/implementasi-kebijakan-satu-peta-mengatasi-permasalahan-antumpang-tindih-lahan>

⁹ I Made Suwitra, "Land Possession Rights And Its Affair." *IUS Journal of Law and Justice Studies* 2 no. 6 (2014): 445~454

¹⁰ Sahlan, Nurul Miqat, Susi Susilawati. "Realizing "Deconstructional" Justice Through Agrarian Civil Law Reform: A Review of Jacques Derrida's Theory." *IUS Journal of Law and Justice Studies* 12 no.3 (2024) E-ISSN 2477-815X, P-ISSN 2303-3827

legal power to protect their interests.¹¹ Some examples of land conflicts involving indigenous communities in Indonesia:

- The Rempang Island land dispute in the Riau Islands. The development of an industrial area sparked a land dispute between the community, the government, and PT Makmur Elok Graha. This conflict escalated in 2023. There were at least two main issues at play: first, the indigenous community had occupied Rempang Island for over 2,000 years, but then, in 2001-2002, the government granted a company a Right to Cultivate (HGU) over land in Batam. Second, the boundaries between the Batam Free Trade Zone Authority (BP Batam) and the community's customary land were unclear, leading to overlapping land ownership.
- The land conflict between PT Lonsum (London Sumatera) and the community of Bulukumba Regency, South Sulawesi. This land conflict stemmed from the conversion of land from a 1919 erfpacht (land acquisition) and the extension of the Right to Cultivate (HGU), while the indigenous community claimed the land was their customary territory and ancestral land. This conflict has persisted for decades, triggering discrimination, protests, violence, and even criminalization. This case demonstrates the unequal land ownership between corporations and indigenous communities, as well as the incomplete adjustment or conversion of western land rights to rights stipulated in the Basic Agrarian Law

Based on data from the Agrarian Reform Consortium (hereinafter abbreviated as KPA), agrarian conflicts increased in 2022, there were 212 (two hundred and twelve) agrarian conflicts with a conflict area of 1,035,613 hectares (one million thirty-five thousand six hundred thirteen hectares) of land with 346,402 families (three hundred and forty-six thousand four hundred and two heads of families) affected¹².

For an archipelagic country the size of Indonesia, this challenge has a double complexity. Land administration systems typically operate under policy, legislative and institutional frameworks that have evolved over a prolonged period of time.¹³ The digital technology is transforming the economic paradigm and mechanisms used to create value and generate benefits, i.e., efficiency, effectiveness, and customization, as well as quality and innovative products,¹⁴ including within the scope of agrarian law that requires innovative development. In the current era of globalisation, advances in information and communication technology have brought about major changes in various aspects of life, including in the field of land administration.¹⁵ The Indonesian government, through the Ministry of Agrarian Affairs and Spatial Planning/ National Land Agency (ATR/BPN), is striving to modernise public services,¹⁶ there is a growing turn towards digital land registries to enhance the transparency and efficiency of land administration processes¹⁷ as well as strengthen legal legitimacy. The reality of pluralism in Indonesian agrarian law, which is based on unwritten customary law, sometimes clashes with

¹¹ I Made Suwitra, The Existence of Ulayat Lands and Its Problems for the Strengthening of Ulayat Villages in Bali, *Wicaksana: Journal of Environment and Development* 4 no. 1 (2020)

¹² DA, Ady Thea. 2022. KPA: Throughout 2022 there were 212 'eruptions' of agrarian conflicts. January 9. <https://www.hukumonline.com/berita/a/kpa--sepanjang-2022-terjadi-212-letusan-konflik-agraria-lt63bc2116991c6/>

¹³ Cai, Maine, Murtazashvili, Ilia, Murtazashvili, Jennifer, 2020. The politics of land property rights. *J. Inst. Econ.* 16:151–167.

¹⁴ Mohammed Ali Berawi, "Innovative Digital Technology and Economy Capacity Development. *International Journal of Technology* 13. No. 7 (2022):1369-1372 DOI: <https://doi.org/10.14716/ijtech.v13i7.6277>

¹⁵ Adiyanti, N. K. W. S., & Pidada, I. B. A., "The Role of Land Deed Making Officials in the Issuance of Electronic Land Certificates." *Student Research Journal*, 2 no.4, 382–396. DOI: <https://doi.org/10.55606/srjyappi.v2i4.1421>

¹⁶ Kartono, S. A., & Rakhmatullah, B. R. Effectiveness of Land Registration Electronic Certificates of Government Assets. *UMPurwokerto Law Review*, 4 no. 2 (2024): 309–320. <https://jurnalnasional.ump.ac.id/index.php/umplr/article/view/19569>

¹⁷ Daivi Radima-Taylor, "Digitizing land administration: The Geographies and Temporalities Of Infrastructure Promise. *Geoforum*", 122. June (2021): 40-151. DOI: <https://doi.org/10.1016/j.geoforum.2021.04.003>

positive law. This is one of the sources that trigger prolonged structural conflicts. In reality, the UUPA does normatively recognize the existence of customary land, but this recognition is conditional and limited. For example, the concept of customary land in Minangkabau is communal in nature and can be owned by clans or tribes, not individuals. Furthermore, the hierarchical ownership system consists of tribal customary land, community customary land, and village customary land. Furthermore, this conceptual order in Minangkabau society is not written down, but exists and is recognized through social practices and serves as customary legitimacy. The inability of national law to accommodate all the needs of this diversity of customary law is not only a technical issue but also a matter of differing legal paradigms—namely, law that exists within society and written law—ultimately becoming a major source of agrarian conflict in Indonesia.

When linked to Article 33 paragraph 3 of the 1945 Constitution and its derivatives in Article 2 or 2 of the UUPA which refer to the concept of the State's Right to Control, which will be interpreted differently in each regime of power in Indonesia. Referring to several Constitutional Court decisions regarding the State's Right to Control, they simultaneously state that the State's Right to Control is interpreted as a public right. The State is not in a position to own natural resources, but is present to formulate policies (*beleid*), carry out regulations (*regelendaad*), carry out administration (*bestuurdaad*), carry out management (*beheersdaad*), and carry out supervision (*toezichthoudendaad*). Therefore, the implementation of HMN must pay attention to existing rights, both individual rights and collective rights held by customary law communities (*ulayat* rights), the rights of indigenous communities and other constitutional rights held by the community and guaranteed by the constitution¹⁸.

Land law transformation can no longer be carried out partially by the state alone, governance is needed that is carried out collaboratively. Collaborative Governance in Theory and Practice” is an approach to decision making and resource management that involves various stakeholders in the decision making process and policy implementation.¹⁹ A governance arrangement in which one or more government agencies directly engage non-state stakeholders in a formal, consensus-oriented, and well-thought-out collective decision-making process aimed at creating or implementing public policy or managing public programs or assets.²⁰ This collaboration concept adopts the principle of Quadruple Helix, which synergizes the strengths of Government, Academia, Industry, and Communities,²¹ particularly in fostering inclusive and participatory governance approaches.²²

In the midst of efforts to find a balance between digital modernization and local wisdom, the concept of **“Ius Integrum Nusantara 2045”** finds its urgent relevance for the development of national agrarian policies. In the perspective of *Ius Integrum Nusantara 2045*, the modernization of agrarian law in the digital era must be able to guarantee substantive justice and public morality. In the absence of a historical record of the definition of public morality and its scope, the norm remains contained in the GATT-WTO and is considered a relevant

¹⁸ Tody Sasmitha Haryo Budhiawan Sukayadi, Laporan Penelitian, Pemaknaan Hak Menguasai Negara Oleh Mahkamah Konstitusi (Kajian terhadap Putusan MK No. 35/PUU-X/2012; Putusan MK No. 50/ PUUX/ 2012; dan Putusan MK No. 3/PUU-VIII/2010). STPN Press, Desember 2014

¹⁹ Ansell, C., & Gash, A. “Collaborative Governance in theory and practice.” *Journal of Public Administration Research and Theory* 18 no.4 (2008): 543–571. <https://doi.org/10.1093/jopart/mum032>

²⁰ Wulan Puspita Puri, Ni Luh Gede Maytha Puspa Dewi, Widya Kartika. “Transformation of Ulayat Land Administration: Collaborative Governance Perspective in West Sumatra.” *Journal of Public Policy* - Vol. 10 No. 1 (2024) January. <https://doi.org/10.35308/jpp.v10i1.8543>

²¹ Ikhsan Lubis, *Reformulation of Land Law: Constitutionality, Justice, and Ulayat-National Integration*. (Bandung: Kent Media, October 2025)

²² Suaree, Nur A. S. M., and Muhamad N. Uz Zaman. “Public Participation in Social Impact Assessment: Comparative Human Rights Legal Approaches in Malaysia and Indonesia.” *Law Reform* 21, no. 2 (2025): 419-443. Accessed March 18, 2026. <https://doi.org/10.14710/lr.v21i2.69408>; M. Suaree, Nur Atheefa Sufeena, Sharifah Zubaidah Syed Abdul Kader, and Mariana Mohamed Osman. 2024. “The Implementation of Public Participation for SIA and EIA in Malaysia”. *Planning Malaysia* 22 (30). <https://doi.org/10.21837/pm.v22i30.1420>.

clause to be used.²³ Public morals, can vary in time and space, depending upon a range of factors, including prevailing social, cultural, ethical and religious values.²⁴ This means that the digital land system must not be a tool that is “blind” to human values, but must be able to accommodate the rights of indigenous peoples and living local values (*the living law*). In this framework, recognition of living law in society becomes crucial, in line with the concept of living law by Eugen Ehrlich: “at the According to him, the concept of The Living Law is the focal point of the formation and development of law within society itself. It is a norm that arises from the activities of members of a community group in the social space that dominates society’s life, even though it is not always formulated in a formal manner but always reflects the values within the society²⁵.”

Until now, there is still a rare legal literature that integrates the technical aspects of digital transformation, the sociological aspects of *Quadruple Helix collaboration*, and the philosophical aspects of *Ius Integrum Nusantara* in one complete analytical framework, particularly in relation to the role of public participation in shaping inclusive governance outcomes²⁶.

It is this theoretical and practical gap that underlies the substance that will be discussed in this paper aims to discuss:

1. How the concept of Digital Transformation in Land Administration can reduce agrarian conflicts?
2. How can the *Quadruple Helix* model be operationalized to create inclusive national agrarian governance?
3. How can the *Ius Integrum Nusantara* 2045 Paradigm based on the *Quadruple Helix* Model be a normative framework for national Agrarian Governance reform in Indonesia?

2. ANALYSIS AND DISCUSSION

2.1. The concept of Digital Transformation in Land Administration can reduce agrarian conflicts

Considering in the MPR Tap Number IX of 2001 concerning Agrarian Reform and Natural Resources Management, the mandate of the constitution and the directives of TAP MPR were then accommodated by the government in issuing various regulations as legal references for implementing agrarian reform in Indonesia. (Ramadhani et al., 2014)²⁷ The birth of the MPR TAP Provisions shows the awareness that the management of agrarian resources that has been going on so far has caused a decline in environmental quality, inequality in the structure of control, ownership, use, and utilization and caused various conflicts.

This digital transformation of land administration cannot be separated from the legal dimension. Integrating legal, technological, and social dimensions, this reform is expected to serve as a model for other developing countries in achieving effective land administrations.²⁸

²³ Neni Ruhaeni, Eka An Aqimuddin, Hadian Afriyadi. “Public morality as well as public as the basis for verifying the obligation of halal certification of food products in Indonesia based on the 1994 GATT-WTO.” *Journal of Law & Development* 52 No. 1 (2022): 111 - 127 ISSN: 0125-9687 (Print) E-ISSN: 2503-1465 (Online)

²⁴ Pelis Serpin, “The Public Morals Exception After The WTO Seal Products Dispute: Did the Exception Swallow the Rules?,” *Columbia Business Law Review* 216 no. 1:217 (2016) : 233

²⁵ Ratih Lestarini, The Sociological Perspective on The Study of The Living Law: Is it a Part of Legal Discipline or Social Discipline?., *Jurnal IUS Kajian Hukum dan Keadilan*, Volume 11 Issue 3, Desember 2023, E-ISSN 2477-817X, P-ISSN 2303-3827

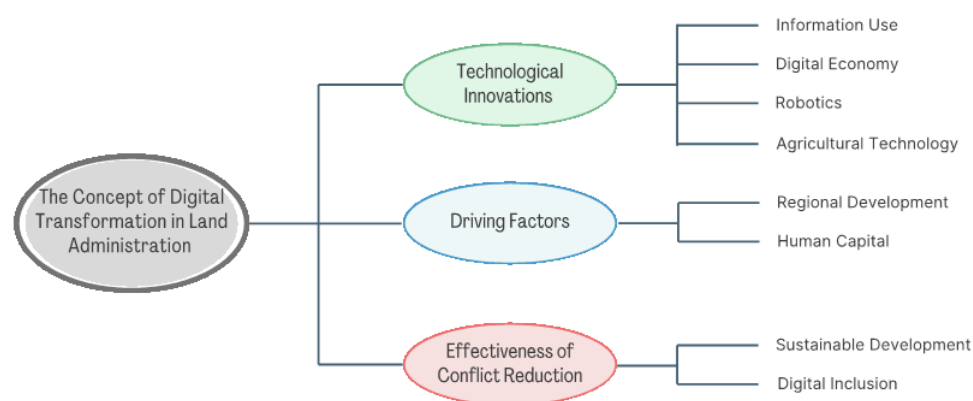
²⁶ Suaree, Nur A. S. M., and Muhamad N. Uz Zaman. “Public Participation in Social Impact Assessment: Comparative Human Rights Legal Approaches in Malaysia and Indonesia.” *Law Reform* 21, no. 2 (2025): 419-443. Accessed March 18, 2026. <https://doi.org/10.14710/lr.v21i2.69408>;

²⁷ Rahmat Ramadhani, Ida Hanifah, Farid Wajdi. “Presidential Decree Number 62 of 2023: Distortion Regulation or Acceleration Solution for Agrarian Reform?.” *Journal of De Jure Legal Research* 24 no. 1 (2014)

²⁸ Clarabella Marella, “Digital Revolution in Land Affairs: Transformation of Land Certificates Through Electronic Mortgage Service.” *The Indonesian Journal of International Clinical Legal Education* 6 no. 4 (2024): 551-580, <https://doi.org/10.15294/icc.le.v6i4.18929> Available online since: January 01, 2025

Laws must be designed progressively, adapting to the pace of technological innovation without sacrificing the principle of justice.²⁹ Therefore, an adaptive and futuristic legal paradigm is needed to guide the modernization of civil law and agrarian law in the digital era. Digital transformation in the agrarian sector is increasingly positioned as a strategic instrument to overcome structural agrarian conflicts that have long been a latent problem in many developing countries, including Indonesia. In this context, digital transformation in the field of land administration offers opportunities for systemic reconstruction through the integration of technological innovations, strengthening social driving factors, and updating agrarian relations that are more inclusive and transparent.

In line with the description in the concept map of digital transformation in the land administration, there are 3 main axes: technological innovation, driving factors, and effectiveness in conflict reduction. These three dimensions form an analytical framework that explains the contribution of digitalization to the transformation of agrarian structures and the dynamics of land law conflicts. **Figure 1.** Digital Transformation Concept Map in the land administration.



2.1.1. Technological Innovation as the Foundation of Agrarian Transformation

The first dimension in the concept map places **technological innovation** as the foundation of agrarian digital transformation. These innovations include the use of information, digital economy, robotics, and agricultural technology. From an agrarian perspective, technology not only functions as a tool to increase productivity, but also as an instrument for restructuring the power relationship over land and resources. Although some legal reforms have been enacted, significant gaps persist in enforcement,³⁰ effectiveness and consistency of Indonesia's institutional and legal framework are crucial to harnessing digital transformation to drive sustainable economic growth and social welfare.³¹ The use of digital information, especially through information technology-based land and agricultural data systems, plays a crucial role in increasing transparency and accountability.

Despite progress, Indonesia's digital infrastructure is still underdeveloped in many regions, particularly in rural and remote areas. Limited access to high-speed internet and digital tools continues to exclude large portion of the population from fully participating in

= Dwi Oktareza, Andreyan Noor, Erliyando Saputra, Aulia Vivi Yulianingrum. Digital Transformation 4.0: Innovations That Drive Global Change 2 no. 3 (2024), <https://doi.org/10.70193/cendekia.v2i3.98>

³⁰ Imam Asmarudin et al., "Initiating the Reform of Principle Norms in the Formation of Laws in Indonesia," *IUS Journal of Law and Justice Studies* 12 no. 2 (2024): 208–26, <https://doi.org/10.29303/IUS.V12I2.1390>

³¹ Fitri Kartiasih et al., "Inequalities of Indonesia's Regional Digital Development and Its Association with Socioeconomic Characteristics: A Spatial and Multivariate Analysis," *Information Technology for Development* Vol.29 issue 2–3 (2023), <https://doi.org/10.1080/02681102.2022.2110556>.

the digital economy.³² Regulatory frameworks have struggled to keep up with the evolving dynamics of the digital economy. Critical issues, such as³³ digitization of tenure, land use, and licensing data, allow for more accurate and evidence-based identification of overlapping claims. Implementing regulations that encourage the localization of digital services and ensure that data generated in Indonesia remains under national control will protect the country's digital sovereignty³⁴.

Furthermore, the digital economy must also include space for economic participation for smallholders in the agrarian community. With digital platforms, farmers can access markets directly, obtain fairer prices, and reduce reliance on distribution chains that are not in favor of farmers. One of the agrarian conflicts is also triggered by economic pressure, so that the design of the digital economy will have the opportunity to simulate potential conflicts. The application of robotics and digital agricultural technology can also be a driving factor for the efficiency and sustainability of land management. Agriculture is one of the sectors that drives the economic development of a country.³⁵ The adoption and use of Digital agriculture technologies vary across different regions of the world, and there are several factors that influence this variation. In Europe, there is a relatively high level of adoption and use of Digital agriculture technologies, particularly in countries with a high level of agricultural production, such as France, Germany, and the Netherlands. The European Union has also been promoting the adoption of Precision Agriculture practices through its Common Agricultural Policy³⁶ In North and South America, the adoption and use of Digital agriculture technologies are relatively high, and the United States, Brazil, and Canada being among the leading countries in this area. These countries have been early adopters of Precision Agriculture practices and have been investing in research and development of new technologies. In Asia, the adoption and use of Digital agriculture technologies are growing rapidly, and China being a leading country in this area. The Chinese government has been promoting the use of Precision Agriculture technologies to increase crop yields and reduce environmental impact.³⁷ Overall, the adoption and use of Digital agriculture technologies vary across different regions of the world, and are influenced by factors such as access to technology and infrastructure, government policies and initiatives, and investment in research and development³⁸.

Indonesia as an agrarian country has great potential to develop the application of robotic and agricultural technology, considering that agricultural land is a fundamental part of the national agrarian development program, including through: the Land Reform program, currently known as Agrarian Reform, where agricultural land is the main focus to be redistributed to farmers who do not have land, then in land management

³² Fitri Kartiasih et al., "Inequalities of Indonesia's Regional Digital Development and Its Association with Socioeconomic Characteristics: A Spatial and Multivariate Analysis," *Information Technology for Development* Vol.29 issue 2–3 (2023), <https://doi.org/10.1080/02681102.2022.2110556>.

³³ Carlo Rossotto et al., "Digital Platforms: A Literature Review and Policy Implications for Development." *Competition and Regulation in Network Industries* 19 no. 1-2 (2018). <https://doi.org/10.1177/178359171880948>

= Bayu Dwi Anggono, Rofi Wahanisa, Aulia Oktarizka Vivi Puspita Sari A.P, Septhian Eka Adiyatma. "Interrogating the Legal Foundations of Digital Transformation: Balancing Economic Growth and Social Welfare in the Era of Disruption." *Volksgeist: Journal of Law and Constitution* □ 8 no. 1 (2025), <https://doi.org/10.24090/volksgeist.v8i1.12211>

³⁵ Putra, R. A. F., Islami, M., Dhenti, S., & Sahrina, A, "Grade: Actualization of Digital Agriculture Development in Improving the Economic Sector." *National Scientific Papers* 3 no. 1 (2022): Telkom Institute of Technology Surabaya.

³⁶ E.L. Bolfe, et al., Precision and digital agriculture: adoption of technologies and perception of Brazilian farmers, *Agriculture* 10 no. 12 (2020): 653, <https://doi.org/10.3390/AGRICULT>

³⁷ Addis Benyam, Tammara Soma. "Digital agricultural technologies for food loss and waste prevention and reduction: global trends, adoption opportunities and barriers", *Journal Cleaner Production* 323 (Nov. 2021), 129099, <https://doi.org/10.1016/J.JCLEPRO.2021.129099>

³⁸ Lukman Raimi, Mirela Panait, Ramotu Sule, "Leveraging precision agriculture for sustainable food security in sub-Saharan Africa: a theoretical discourse," in: *Shifting Patterns of Agricultural Trade*, Springer, Singapore (2021): 491–509, https://doi.org/10.1007/978-981-16-3260-0_21

for the transfer of agricultural land functions become non-agricultural, and government programs are directed towards sustainable agricultural development.

2.1.2. Driving Factors: Regional Development and Human Capital

The second dimension in the concept map highlights the driving factors that determine the success of digital transformation, namely regional development and human capital development. Regional development, in many theories, can be used as a basis to explain the importance of regional development.³⁹ Regional development is about the geography of welfare and its evolution. It has played a central role in disciplines such as economic geography, regional economics, regional science, and economic growth theory.⁴⁰ Regional development is a strategic effort to improve economic and social welfare with a regional pattern by utilizing local potential. The concept of regional development is a planned process to improve regional welfare in an integrated manner. In this context, spatial planning and land management policies are operational instruments to realize regional development goals. Spatial planning and land management are an inseparable unit, because land is a subsystem of space,⁴¹ so land management is part of spatial planning, both have the same legal basis. The relationship between regional development and spatial and land management policies is functional and reciprocal. On the one hand, regional development increases the need for land and drives changes in land use. On the other hand, the space and land stewardship policy ensures that the changes proceed in a manner that is in line with the long-term development plan.

In Law Number 24 of 1992 currently regulated in Law Number 20 of 2007 concerning Spatial Planning, Article 1 paragraph (1) determines that space is a container that includes land space, ocean space and airspace, as a unit of territory where humans and other living beings live and carry out activities and maintain the continuity of their lives, the principle of spatial planning is for all interests, in an integrated, effective, efficient, aligned, balanced, sustainable and open manner; Meanwhile, one of the goals is the implementation of space utilization regulations for protected areas and cultivation areas. Spatial planning can ensure the realization of harmony, harmony, and balance of structures and patterns of space use for the distribution of population between regions, growth and development between sectors, between regions, and between sectors and regions in one unity of the Nusantara Insight.

The principles contained in spatial planning policies are a fundamental part of regional development. In this case, the policy of spatial planning and land management as a planning instrument in regional development that directs the location, scale, and intensity of development activities so as not to provoke conflicts of space and land use.

Another driving factor in the transformation of the agrarian structure is also influenced by Human capital as the basis of intellectual capital in Indonesia which includes knowledge, skills, abilities and attitudes, which will result in increased performance and increased profitability.⁴² Subsequently, human capital and growth have become a continuous debate. Some studies

³⁹ Ridwan. Sapruji. Regional Economic Development. (Yogyakarta, Pustaka Puitika, First Printing, December 2016.)

⁴⁰ P. Nijkamp, M. Abreu. Regional Development Theory. International Encyclopedia of Human Geography, (2009): 202-207. <https://doi.org/10.1016/B978-008044910-4.00869-5>

⁴¹ Totok Dwinur Haryanto, Land Management Model in Indonesia Based on Law Number 5 of 1960. Jurnal Wacana Hukum 8 no. 2 (2009). DOI: <https://doi.org/10.33061/wh.v8i2.312>

⁴² Maryam Mahdinezhad, et al. (2018), 'Human Capital Creation in Educational Organizations: The Role Of Knowledge Management', Proceedings of 135 th /SERD Institutional Conference, Kuala. Mud.. Malaysia. 18th -19th October 2018.

have shown that more investment in human capital, through education will increase positive economic growth,⁴³ in Indonesia economic growth will be effective when investment in human capital is increased⁴⁴.

Based on data in 2025 from the United Nation Development Programme (UNDP), Indonesia ranks 113th out of 193 in terms of human capital development with a score of 0.728. According to data from the Central Statistics Agency (BPS), Indonesia's human development is still increasing. Indonesia's human development status has changed from "moderate" to "high" since 2016. In 2025, Indonesia's Human Development Index (HDI) will reach 75.90, an increase of 0.88 points compared to the previous year of 75.02. This data confirms that the increase in HDI should not be seen as a mere statistical achievement, but rather as a foundation that must be immediately converted into digital competence. If *Human Capital Development* fails to keep pace with the influx of technological innovation, then digital transformation has the potential to widen inequality and trigger new forms of structural agrarian conflict.

Digital-based regional development in Indonesia is developing rapidly, driven by the great potential of the digital economy and various government initiatives. The main focus at the moment is infrastructure development, human resource improvement (HR), and digitalization of public services to create efficiency and equity across the region. The One Map Policy, which has been observed by Presidential Regulation Number 23 of 2021 concerning the Acceleration of the Implementation of the One Map Policy (PPP), is a single reference of spatial data that is accurate and integrated to support administrative governance and development planning. The One Map Policy as a masterplan for national development in the field of geospatial information. This initiative aims to create an efficient and conflict-free digital land system.

The One Map Policy (KSP) is the government's strategic step to answer the challenges of digital transformation in land law development. One of the results of the One Map Policy (KSP) in the land sector is to provide Thematic Geospatial Information on Land Status.⁴⁵ The solution for implementing KSP in Indonesia will produce One map that becomes a reference to one reference geospatial, one standard, one database, and one geoportal at the level accuracy map with a scale of 1:50,000.⁴⁶ The implementation of KSP which is under the auspices of Presidential Regulation Number 9 of 2016 mandates 3 (three) main activities, namely Compilation, Integration, and Synchronization. Furthermore, since the enactment of Presidential Regulation Number 23 of 2021 concerning Amendments to Presidential Regulation Number 9 of 2016 concerning the Acceleration of the Implementation of the One Map Policy at a Scale Map Accuracy Level of 1:50,000, there has been an additional 1 (one) main activity, namely Sharing Geospatial Data and Information through the National Geospatial Information Network (JIGN), so that until now the One Map Policy (KSP) has 4

⁴³ Zhang, Y., Kumar, S., Huang, X., & Yuan, Y. "Human Capital Quality and the Regional Economic Growth: Evidence from China." *Journal of Asian Economics*, 86, (2023): 101593. <https://doi.org/10.1016/j.asieco.2023.101593>

⁴⁴ Yoga Affandi, Anugrah, Donni F. Anugrah, Pakasa Bary. "Human capital and economic growth across regions: a case study in Indonesia." *Eurasian Economic Review* 9 no. 3 (2018): 331–347, <https://doi.org/10.1007/s40822-018-0114-4>

⁴⁵ Winny Sanjaya. "The Influence Of One Map Policy Of Land Towards Certificate Of Land Title As An Evidence Of Land Claim In Indonesia." *LITRA: Journal of Spatial and Agrarian Environmental Law* 2 no. 2 (2023), <https://doi.org/10.23920/litra.v2i2.1291>

⁴⁶ Wahyuningsih, A, *One Map Policy Direction in Accelerating Agrarian Reform: Efforts to Resolve Agrarian Conflicts. Proceedings of the Seminar on the Actual Law of the Problem of Ease of National Strategy Projects: Conflict of Norms and Challenges of Welfare Direction* (2021): 73–82

main activities, namely Compilation, Integration, Synchronization, and Sharing of Geospatial Data and Information.

2.1.3. Effectiveness in Conflict Reduction: Sustainable Development and Digital Inclusion

In the third dimension of the concept map, digital transformation is directly associated with effectiveness in reducing conflict. This is demonstrated by sustainable development and digital inclusion, which are key indicators of the success of digital transformation in addressing structural agrarian conflicts.

The characteristics of development are dynamic and sustainable, the land system in Indonesia is the main highlight in the context of development because it plays a crucial role in regulating land use in accordance with the principles of sustainability, ecological balance and social justice.⁴⁷ This is supported by sustainable development which is part of conscious and planned efforts, which integrate environmental, social and economic aspects into development strategies to ensure the integrity of the environment as well as the safety, capabilities, welfare and quality of life of current and future generations.⁴⁸ Some important ideas of sustainable development are, first, the idea of the essential needs of the poor which must be the top priority. Second, as a foresight (long-term) that emphasizes the precautionary principle against the potential for serious threats or something that cannot be prevented, to overcome environmental degradation. Third, integrating complex relationships between environmental, economic, and social aspects of society which are the main pillars of sustainable development.⁴⁹ Sustainable development is initiated not only continuous development but development that ensures living conditions that increasingly consider what the impact will be like in the future without reducing the potential of the present and still meeting human needs and aspirations. In this case, land policy must be able to accommodate the needs needed in development, including not ignoring the rights of communities, including the rights of indigenous peoples to their ulayat lands⁵⁰.

In the context of sustainable development, digitalization has become an important instrument to drive growth and competitiveness. The agricultural sector, which has been considered traditional, is starting to adapt to the presence of technology based on the Internet of Things (IoT), big power, artificial intelligence (AI), and mobile applications. The shift from a conventional administrative approach to digital agrarian governance (digital land governance), currently governs technology, data, and digital interaction between the state and its citizens. Meanwhile, digital inclusion in national agrarian development refers to systematic efforts that ensure that all parties, both the government, communities, farmers, business actors, and vulnerable groups, have equal access to technology and information. Digital inclusion is not only an infrastructure issue, but includes legal, social, cultural, and institutional dimensions. In this context, inclusive digital transformation is able to bridge state laws and local agrarian practices, thereby reducing conflicts stemming from the abandonment of traditional rights.

Digital transformation serves as a tool for the reconstruction of agrarian governance that has the ability to reduce inequality, increase legal certainty that guarantees before the law and legislation,⁵¹ and create fairer agrarian relations. Therefore, as long as it is supported by

⁴⁷ Faradila Putri Amalia Kopalit Meiske Mandey Maya Sinthia Karundeng, "Land Tuner System In Sustainable Development And Handling Of Ulayat Land Dispute" *Lex Crimen Journal of the Faculty of Law UNSRAT* 13 no. 3 (2025)

⁴⁸ Yulias Erwin. Environmental Law Enforcement In The Development Of Tourism Sector In Kuta Mandalika Special Economic Region, Central Lombok. *IUS Journal of Law and Justice Studies* 9 no. 2, (2021), E-ISSN 2477-815X, P-ISSN 2303-3827. <http://dx.doi.org/10.29303/ius.v9i2.929>

⁴⁹ Agustina, Triono Eddy. Sustainable Development Legal Policies In The Implementation Of Sustainable Construction At Indonesia. *Pena Justisia: Communication Media and Legal Studies* 22 no. 3 (2023): 1-12

⁵⁰ Sulastri, M. "Land Policy in Sustainable Development: Legal and Environmental Perspectives." *Indonesian Journal of Environmental Law* (2019), 13-27

⁵¹ Onny Medaline, *Land Registration Law Reform: An Epistemic Narrative of Land Registration in the Order of Enforcement of the Job Creation Law*, (Medan: Umsu Press, 2024)

inclusive policies, human capital development, and a commitment to social justice, digital transformation has significant potential to reduce sustainable structural agrarian conflicts.

2.2. Operationalized Quadruple Helix Model to Create an Inclusive National Agrarian Governance

The Quadruple Helix model ensures broad stakeholder engagement, which is crucial for addressing complex land governance issues. This participatory approach helps in aligning diverse interests and fostering collective decision-making.⁵² The Quadruple Helix model, which integrates government, academia, industry, and civil society, can be effectively operationalized to create an inclusive national land law governance system. This model emphasizes the importance of collaboration among these four sectors to foster innovation, sustainable development, and inclusive governance. The Quadruple Helix model offers a robust framework for inclusive governance by fostering collaboration among academia, industry, government, and civil society⁵³.

The Quadruple Helix Model (QHM) is an advanced framework for innovation that extends the traditional Triple Helix Model by incorporating a fourth helix: civil society. This model emphasizes the collaboration between four key sectors: government, academia, industry, and the public, to foster innovation and address complex societal challenges.⁵⁴ According to the collaborative definition of the Quadruple Helix Model, collaboration is a mechanism of democratizing governance that places sustainability, social justice, and innovation as common goals. This model is relevant for addressing the complexity of modern public problems that cannot be solved through a sectoral or single-actor approach alone.

Effective collaboration mechanisms are essential for the success of the Quadruple Helix model. These mechanisms facilitate communication, coordination, and cooperation among stakeholders, leading to more effective and sustainable governance outcomes.⁵⁵ The model promotes the creation of multidisciplinary knowledge exchange platforms and co-creation of solutions, which are vital for addressing land governance challenges.⁵⁶ The Quadruple Helix model supports sustainable regional development by integrating knowledge creation, innovation, and technology. This integration helps in developing policies and practices that are environmentally sustainable and economically viable. The model's emphasis on innovation ecosystems can drive forward indices of creativity and innovation, which are essential for developing inclusive land governance systems.⁵⁷ This ecosystem encourages collaboration among government, academia, citizens, and companies to explore and co-create future public services⁵⁸.

⁵² Amantova-Salmane, Liene. Stakeholders Of Sustainable Regional Development According To The Quadruple Helix Model: A Case Study Of Regional Industrial Parks. Research for Rural Development. *Conference Paper* (2025), DOI: 10.22616/RRD.31.2025.078

⁵³ Sakshi Aggarwal, Stavros Sindakis, "Four pillars of quadruple helix innovation model: An approach for the future." *Spear's Surgery of the Breast: Principles and Art Book Chapter* (2020), 9-28. DOI: <https://doi.org/10.2211/02-017-0001-1-978/10,1108>

⁵⁴ Luisa Barbosa Gómez, Magdalena Wailzer, Laura Soyer, Anna Gerhardus, Francisco González Estay, Vincent Blok, Gema Revuelta. Strategies to Overcome Collaborative Innovation Barriers: The Role of Training to Foster Skills to Navigate Quadruple Helix Innovations. *Journal of the Knowledge Economy* (2024): 15:10057–10087 <https://doi.org/10.1007/s13132-023-01467-7>

⁵⁵ Ruta Ciutienė, Nanak Kholiavko, Andrii Karpenko, etc. Synergy Effects for Project Stakeholders Under the Quadruple Helix Model. *Proceedings of the IEEE International Conference on Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications, IDAACS Conference Paper* (2023). DOI: 10.1109/IDAACS58523.2023.10348760

⁵⁶ Bharosa, N. , Janssen, M. Digicampus - Preliminary Lessons From A Quadruple Helix Ecosystem For Public Service Innovation. *CEUR Workshop Proceedings* 2797 (2020): 195-203

⁵⁷ Sakshi Aggarwal, Stavros Sindakis, "Four pillars of quadruple helix innovation model: An approach for the future." *Spear's Surgery of the Breast: Principles and Art Book Chapter* (2020), 9-28. DOI: <https://doi.org/10.2211/02-017-0001-1-978/10,1108>

⁵⁸ Bharosa, N. , Janssen, M. Digicampus - Preliminary Lessons From A Quadruple Helix Ecosystem For Public Service Innovation. *CEUR Workshop Proceedings* 2797 (2020): 195-203

The Quadruple Helix Model represents a comprehensive approach to innovation, integrating government, academia, industry, and civil society to address complex societal challenges. While it offers significant benefits in terms of synergy and sustainability, it also presents challenges related to stakeholder management and interaction. Effective implementation of the Quadruple Helix Model requires careful consideration of these dynamics to achieve successful and responsible innovation outcomes⁵⁹.

Various case studies, such as the regional industrial parks and the Blue Economy in Qingdao, demonstrate the practical application of the Quadruple Helix model. These examples highlight the model's potential to enhance regional competitiveness and promote sustainable development through stakeholder collaboration. (Gianluca et al., 2021)⁶⁰ The Digicampus initiative in the Netherlands showcases how the Quadruple Helix model can be used to explore future public services and foster public service innovation through collaborative efforts⁶¹.

Ikhsan Lubis said in his book that⁶² building a transformative land law ecosystem, the ideal collaboration involves involving four main elements of government, civil society, the business sector, and academic institutions. Quadruple Helix creates synergies to produce land policies that are knowledge-based, participatory, and solution-oriented. The government as a regulator, the public as the owner of direct interests, the business sector as the implementer of economic policies, and academics as *the provider of evidence-based policies*, must work together in a living and civilized legal system.

2.3. The Ius Integrum Nusantara 2045 paradigm based on the quadruple helix model can be a normative framework for national agrarian governance reform in Indonesia

Until 2025, the implementation of agrarian governance reform in Indonesia will still face various complex structural problems, not just a collection of caustic disputes, but agrarian conflicts are a structural manifestation of inequality in land tenure and ownership, which is exacerbated by weak legal certainty in the regulatory framework that prioritizes the acceleration of investment, including National Strategic Projects over protection. basic rights of the community. The Agrarian Reform Consortium (KPA) noted that in 2024 there will be 295 agrarian cases occurring on land covering an area of 1,113,577.47 hectares and impacting 67,435 families in 349 villages. This figure increased by 21 % compared to 2023, which was 241 cases. The data for 2025 is expected to be not much different from the previous year.

The Ius Integrum Nusantara paradigm based on *the Quadruple Helix* Model is offered as a new normative framework to reformulate national agrarian governance in an integrative, inclusive, and sustainable manner. The perspective of Ius Integrum Nusantara is not just an effort to improve cosmetics, but an agenda to change the fundamental legal paradigm. This approach positions land law not only as a regulatory instrument, but also as a means of enforcing substantive justice, strengthening social legitimacy, and protecting local cultural values.⁶³ Within this normative framework, *the Quadruple Helix* Model is a relevant operational approach to bridge the fragmentation

⁵⁹ Starkbaum, Johannes, Braun, Robert; Blok, Vincent, Schroth, Fabian; Häußermann, Johann Jakob, etc. "Responsible Innovation Across Societal Sectors: A Practice Perspective On Quadruple Helix Collaboration." *Journal of Responsible Innovation* 11 no. 1. (2024), <https://doi.org/10.1080/23299460.2024.2414531>

⁶⁰ Sampaolo, Gianluca. Lepore, Dominique. Spigarelli, Francesca. Blue Economy And The Quadruple Helix Model: The Case Of Qingdao. *Environment, Development and Sustainability* Article 23 no. 11 (2021). DOI: [10.1007/s10668-021-01378-0](https://doi.org/10.1007/s10668-021-01378-0)

⁶¹ Bharosa, N. , Janssen, M. Digicampus - Preliminary Lessons From A Quadruple Helix Ecosystem For Public Service Innovation. *CEUR Workshop Proceedings* 2022-190 : (2020) 2299

⁶² Ikhsan Lubis, *Reformulation of Land Law: Constitutionality, Justice, and Ulayat-National Integration*, (Bandung: Kent Media, 2025)

⁶³ Ikhsan Lubis, Taufik Siregar, Duma Indah Sari Lubis, Rodiatun Adawiyah, Andi Hakim Lubis. Integration of Ulayat Law in the National Agrarian Law System: Challenges and Solutions in the Recognition of Ulayat Rights. *Agricultural Tunas* 8 no.2 (2025): 143-158, e-ISSN: 2622-9714

of actors and interests in collaborative agrarian management with the integration of formal and local knowledge. The *Ius Integrum Nusantara* paradigm, when integrated with the Quadruple Helix Model, has the potential to be a normative framework for national agrarian governance reform in Indonesia. This approach is aligned with the broader vision to achieve a “Golden Indonesia 2045” and address the challenges of agrarian reform.

Key Elements of the *Ius Integrum Nusantara* Paradigm: Integrative Ideology: Rooted in the integrative ideology articulated by Soepomo in 1945, which emphasizes harmony between macrocosmic and microcosmic forces within the state.⁶⁴ Sustainable Development: The paradigm aims to foster inclusive, sustainable, and prosperous development, leveraging advanced technologies and smart city frameworks.⁶⁵ The Quadruple Helix Model represents a comprehensive approach to innovation, integrating government, academia, industry, and civil society to address complex societal challenges. While it offers significant benefits in terms of synergy and sustainability, it also presents challenges related to stakeholder management and interaction. Effective implementation of the Quadruple Helix Model requires careful consideration of these dynamics to achieve successful and responsible innovation outcomes.

Furthermore, Ikhsan Lubis explained that the concept of *Ius Integrum Nusantara* introduces five main pillars as the strategic foundation for the renewal of the agrarian legal system focused on four fundamental aspects, namely the determination of agrarian subjects in an inclusive manner, the recognition of agrarian objects that are non-commercial and socially functional, the formation of institutional structures that are participatory and responsive to the needs of the community, and the determination of legal instruments that are adaptive to the dimensions of the agrarian law ecological justice.⁶⁶ These five pillars are normative frameworks that gain their operational power and social legitimacy when energized with the Quadruple Helix Model. The Quadruple Helix not only serves as a model of development collaboration, but also as an integrative mechanism that allows the four fundamental aspects of the reform of the agrarian legal system to work coherently and sustainably through the involvement of the government, academia, industry (business sector), and society.

The *Ius Integrum Nusantara* concept, with its five main pillars, constitutes a normative framework inherently oriented toward realizing social justice in the agrarian legal system. Integration with the Quadruple Helix Model strengthens its operationalization and social legitimacy. The integration between *Ius Integrum Nusantara* and the Quadruple Helix Model emphasizes that social justice is not only a normative goal, but is also realized practically in inclusive, participatory, and sustainable agrarian governance.

First, the **determination of agrarian subjects in an inclusive manner** is strengthened through the role of the community in general. Within the framework of the Quadruple Helix, community collaboration that represents the interests of local communities, indigenous peoples, and vulnerable groups, for example, Active community involvement, especially through the transparency of the process of forming draft local regulations, and the involvement of traditional leaders, is the key to integrating

⁶⁴ Arif Hidayat, Laga Sugiarto, Sulistianingsih, Dewi Ananta, Bintang Rafli, Muhammad Abid A Syakur. Study of Regulatory and Institutional Framework for the Relocation of the National Capital in Indonesia. *Journal of Law and Legal Reform* 5 no. 4 (2024), DOI: <https://doi.org/10.15294/jllr.v5i4.13566>

⁶⁵ Sugeng Susanto, Al-Amin, etc. “Measuring The Influence of The Central Business District Development of SDGs on The Growth and Income of People Affected by The Development of The New Nusantara Capital City.” *International Journal of Accounting and Economics Studies* 12 no.4 (2025): 447-454. DOI <https://doi.org/10.14419/q4d9fn39>

⁶⁶ Ikhsan Lubis, Taufik Siregar, Duma Indah Sari Lubis, Rodiatun Adawiyah, Andi Hakim Lubis. Integration of Ulayat Law in the National Agrarian Law System: Challenges and Solutions in the Recognition of Ulayat Rights. *Agricultural Tunas* 8 no.2 (2025): 143-158, e-ISSN: 2622-9714

local wisdom into local regulations⁶⁷, as widely recognised in studies on participatory governance and social impact assessment frameworks.⁶⁸ Thus, the role of government, academia, including the business sector, is not reduced to a mere economic entity, but is recognized as a legal subject that has social, cultural, and ecological dimensions.

Second, the recognition of agrarian objects that are non-commercial and have a social function is in line with the logic of the Quadruple Helix which places sustainability as a common goal across the collaboration of the parties in carrying out national agrarian development. In this case, academics play a role in developing the conceptualization of agrarian objects as socio-ecological resources, not just economic needs that injure basic rights of society. The government then translated the concept into a policy to protect living spaces, areas of ecological value. The business sector, directed to adopt the principles of green economy and social responsibility, as well as the community functions as a guardian of values that ensure that these non-commercial functions are not eroded by economic interests alone.

Third, the establishment of an institutional structure that is participatory and responsive to the needs of the community directly reflects the essence of the Quadruple Helix. This model demands the transformation of agrarian institutions from a closed bureaucracy into a multi-actor collaborative arena. Therefore, the agrarian institutions that were born were not only administratively responsive, but also sensitive to social and ecological dynamics at the local level.

Fourth, the establishment of legal instruments that are adaptive to the ecological justice dimension finds its relevance in the Quadruple Helix collaboration that drives knowledge and practice-based legal reform.

Based on the social reality of agrarian structural conflicts in Indonesia, by placing existing conditions as a starting point to diagnose a paradigm crisis, formulate alternative paradigms, and design implementation mechanisms and strategic outcomes. So the structure is explained in the framework of thinking in.

Table 1. Ius Integrum Nusantara Paradigm Framework, Agrarian Governance Reform
Based on Quadruple Helix

Stages of Analysis	Main Dimensions	Key Elements	Conceptual Meaning & Analytical Function
I. Existing Conditions	Indonesian Agrarian Governance	- Inequality of land tenure - Structural agrarian conflict - Fragmentation of regulations and institutions - Marginalization of ulayat laws and ulayat rights - Development-ecological incompatibility	It describes the problematic agrarian structural reality and becomes the starting point for analysis. Conflict is not incidental, but systemic.
II. Problem Diagnosis	Paradigm Crisis	- Dominance of legal-formal approaches - Policy sectorality - Lack of participation of non-state actors - Social-ecological unresponsive laws	It shows that the source of the problem lies in the positivistic-sectoral agrarian law paradigm that fails to answer the complexity of modern agrarian law.

⁶⁷ Eka NAM Sihombing, "Optimizing Community Participation In The Formation Of Local Regulations Containing the Value of Local Wisdom." *IJRS: International Journal Regulation & Society* 6 no.1 (2025)

⁶⁸ M Suaree, Nur Atheefa Sufeena, Sharifah Zubaidah Syed Abdul Kader, and Mariana Mohamed Osman. 2024. "Social Impact Assessment: A Comparison of the Legal Frameworks in Malaysia and New Zealand". *Planning Malaysia* 22 (33). <https://doi.org/10.21837/pm.v22i33.1542>.

III. The Need for Transformation	Paradigm Shift	- Cross-sectoral integration - Inclusivity of actors - Sustainability orientation - Social & ecological justice	Affirming the urgency of a new paradigm as a prerequisite for national agrarian governance reform.
IV. Alternative Paradigm	<i>Ius Integrum Nusantara 2045</i>	The concept of <i>Ius Integrum Nusantara 2045</i> offers visionary agrarian law reform through five strategic pillars that integrate social, cultural, ecological, and technological aspects.	It functions as a normative-philosophical framework that corrects the limitations of conventional agrarian law and positions law as an instrument of transformation.
V. Operating Model	Quadruple Helix Model	Government: Orchestrator of Agrarian Policy & Justice Academia: Knowledge Producer & <i>Policy Broker</i> Industry: Responsible Land-Based Business Civil Society: Participation, Oversight, & Local Legitimacy	Become a bridge operational between normative paradigms and policy practices through multi-stakeholder collaboration.
VI. Implementation Mechanism	Instruments & Processes	- Cross-actor collaboration - <i>Agrarian policy co-creation</i> - Digitalization & integrated data - Participatory mapping - Integration of land-based green economy	Explain how the Quadruple Helix works concretely in overcoming agrarian conflicts and policy fragmentation.
VII. Governance Reform	Structural Changes	- Substantive legal certainty Reduction of structural agrarian conflicts - Recognition and certification of ulayat rights - Transparency & accountability - Environmental protection	Describe intermediate outcomes from the implementation of paradigms and collaborative models.
VIII. Strategic Outcome	Final Destination	- Fair agrarian governance - Social & legal inclusivity - Ecological sustainability - Agrarian social stability	Showing the strategic contribution of research to the national agenda of <i>Golden Indonesia 2045</i> .

The structure in this framework not only explains what Indonesia's agrarian problems are, but also why they occur and how normative-operational solutions can be designed synergistically so that they are relevant to the agrarian law reform agenda. Thus, the synergy between *Ius Integrum Nusantara* and the Quadruple Helix makes the five pillars of agrarian law reform not stop at the normative level, but move towards a living agrarian law system. Quadruple Helix provides a collaborative and dynamic space for all actors to jointly realize inclusive, socially just, and ecologically sustainable agrarian governance, in line with Indonesia's vision of reforming agrarian law towards 2045.

3. CONCLUSION

This article emphasizes that agrarian conflicts in Indonesia are not a case-specific phenomenon, but rather a manifestation of structural problems rooted in unequal land tenure, weak legal certainty, institutional fragmentation, and the dominance of a

legal-formal and sectoral paradigm of agrarian law. In this context, reforms in agrarian governance are no longer adequate if carried out partially or only focused on the renewal of administrative regulations.

Digital transformation in land administration has proven to have strategic potential to reduce structural agrarian conflicts through land data integration and increased transparency, accountability, and public participation. However, this will depend on policy design, institutional readiness, and inclusive public access. In this context, digitalization serves as an instrument to improve three crucial aspects: data transparency, administrative accuracy, and public accessibility.

Digital transformation, including through the One Map Policy and integrated geospatial information systems, enables more accurate identification of overlapping land rights and strengthens legal certainty. However, it is important to recognize that digital transformation is not a single solution. The success of digitalization in minimizing agrarian conflicts requires the integration of technological innovation, institutional reform, and inclusive community involvement.

Therefore, it can be concluded that digital transformation has strong potential to reduce agrarian conflicts, particularly through increased transparency, data accuracy, and information accessibility. However, these positive impacts can only be achieved if its implementation is carried out carefully, participatory, and based on social justice.

The Quadruple Helix model is offered as a relevant operational approach to create inclusive national agrarian governance. Collaboration between the government as the policy orchestrator, academics as knowledge producers, the industrial sector as responsible land-based economic actors, and society including indigenous communities as direct stakeholders, enables the formation of more democratic and sustainable co-creation mechanisms of agrarian policy. This approach is not only relevant for reducing structural agrarian conflicts, but also contributes strategically to the national development agenda and the vision of Golden Indonesia 2045, by positioning agrarian law as an instrument of civilized socio-ecological transformation.

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